



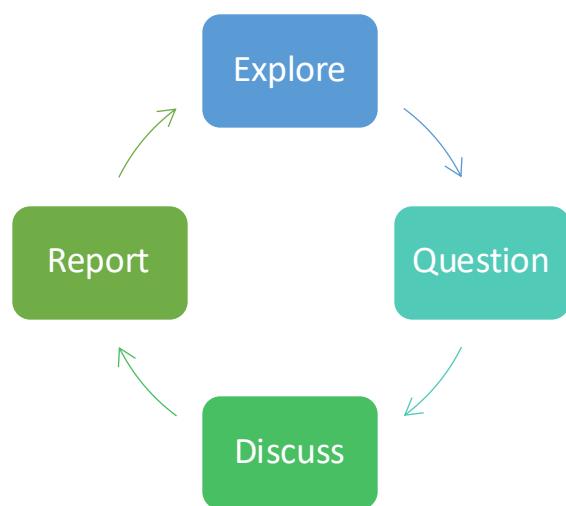
How important is the teaching of science?

Teacher Standards 1 – 8 all apply to teaching science, a core subject

- **TS 1** High expectations that inspire, motivate and challenge pupils
- **TS 3** Good subject knowledge and curriculum knowledge
- **TS 4** Plan and teach well-structured lessons
- **TS 5** Adapt teaching to respond to strengths and needs of all pupils



Practical Science & Exploration



4 step approach to investigation

How do we define 'Working Scientifically'?

National Curriculum expectations:

- all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science
- be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes

1. Enquiry Skills (NC working scientifically) - Use methods /strategies of scientists to find answers

2. Conceptual Knowledge and Understanding - Learn about important 'big' science ideas; Understand the world around them; Develop learning skills they will need throughout life ...

3. Developing Social Skills and Positive Attitudes - Develop positive attitudes; Curiosity, awe and wonder, co-operation and linking to real-life.

Early Science – Understanding the World

People and communities: children talk about ... their own lives ...
... know about similarities and differences between themselves and others ..

The world: ...know about similarities and differences in relation to places, objects, materials and living things. ... make observations of animals and plants and explain why some things occur, and talk about changes.

Technology: ...They select and use technology for particular purposes.

Progression of skills into KS1 and 2:

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. **It should not be taught as a separate strand.**

'working scientifically' ... so that pupils learn to use a variety of approaches to answer relevant scientific questions.

Types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data.

Sequencing science learning

- **Leaders have chosen the knowledge and skills of science they want pupils to know and remember.** Knowledge organisers support the main concepts and ideas that need to be taught.
- **Interleaved content enables children to build understanding of concepts over time.** Moreover, this supports teachers in activating prior-knowledge to build on conceptual understanding and to support retention long-term. *E.g. in EYFS, children learn about plant growth and the concept of things 'growing', this is met again in Year 1, Year 2, Year 3 and then through the study of Living Things and Their Environment.*
- **We have chosen to introduce some topics ahead of KS2 – such as an introduction to electricity in Year 2.** This enables us to further support long-term knowledge retention by activating prior learning and 'planting the seed' of knowledge at an earlier stage.





End of Unit Assessment Animals and their needs

In this unit, we will identify a variety of animals, learn about their characteristics and what they need to survive.

This half term, we will learn about

- The characteristics of different groups of animals (reptiles, mammals, amphibians, birds and fish).
- How different animals can be grouped according to their characteristics.
- What animals need to survive.
- How to classify animals based on what they eat (omnivore, carnivore, herbivore).
- The different body parts of a range of animals and why they are important.
- How to look after and care for animals.



Ongoing self assessment Assessment of learning throughout the unit is based on a range of evidence.	I had some help with my learning	I was able to learn independently	I was able to explain the learning to others
I can identify animals according to where they live			
I can describe animal characteristics of a range of animals			
I can sort animals into different groups using their characteristics			

Assessment of Science Learning

There are two integral components to assessing pupils' understanding.

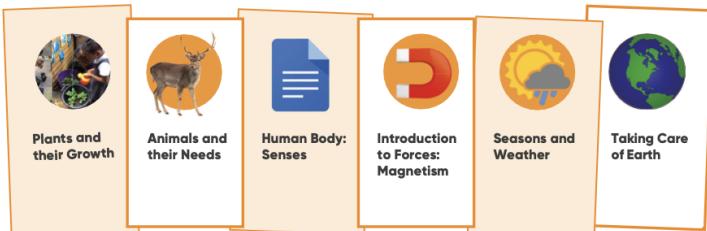
1. **Against the objectives of the unit** and what they have studied in the term.
2. **Against the working scientifically statements** and a self-assessment of the work completed in their Science books.

In addition: progression of lesson-to-lesson knowledge is measured through pedagogical assessment such as: exit tickets, big questions, investigation write-ups.



Working Scientifically Assessment Year 1

This year, we have been learning about



Children rate their achievement against each strand at the end of each unit as part of the pupil conferencing.

Working scientifically strand	Au1	Au2	Sp1	Sp2	Su1	Su2
1. I am able to ask simple questions and I know that they can be answered in different ways.						
2. I am able to observe closely and use simple equipment.						
3. I am able to perform simple tests.						
4. I can identify and classify different things.						
5. I can use observations and ideas to suggest answers to questions.						
6. I can gather and record data to help answer questions.						

Enquiry Based Learning – Science isn't just the MIRO!

Asking questions

Asking questions that can be answered using a scientific enquiry.



Making predictions

Using prior knowledge to suggest what will happen in an enquiry.



Setting up tests

Deciding on the method and equipment to use to carry out an enquiry.



Observing and measuring

Using senses and measuring equipment to make observations about the enquiry.



Recording data

Using tables, drawings and other means to note observations and measurements.



Interpreting and communicating results

Using information from the data to say what you found out.



Evaluating

Reflecting on the success of the enquiry approach and identifying further questions for enquiry.



Utilising Technology to enhance understanding

- **Our VR headsets enable children to activate new learning by providing experiential learning episodes that activate knowledge.** E.g. Science in Y6 'blood and circulatory system' – VR enables you to become red blood cells travelling along.
- VR gives SEND learners the same playing field to understand the content as their peers. Further it supports memory retention.

Substantive vs Disciplinary Knowledge Progression

- **Substantive Knowledge is the knowledge that involves concepts which form the underpinning structure of the subject** e.g. respiration, evolution and the idea of a force. The list of substantive knowledge for science in KS1 and 2 is substantial and aims to create 'big idea' thinking in the fundamental areas of biology, chemistry and physics. We need to frequently practice retrieving the knowledge that builds these concepts, or else we forget them, so low stakes cumulative quizzing is used to support pupils remembering and understanding.
- **Disciplinary knowledge is the knowledge scientists need so they can collect, understand and evaluate scientific evidence** – it's the scientific method and involves the development of skills such as observing, measuring, testing and recording. For example, changing one variable whilst keeping everything else the same and seeing what happens.